North Atlantic

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The Northeast Utilities System

December 14, 2001

Docket No. 50-443

NYN-01102

CR# 01-10868

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Seabrook Station
Licensee Event Report (LER) 01-003-00 for
Reactor Trip Due to a Dropped Rod

Licensee Event Report (LER) 01-003-00 is provided in Enclosure 1. This LER reports an event that occurred at Seabrook Station on October 15, 2001. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A). The North Atlantic Energy Service Corporation commitment associated with this LER is contained in Enclosure 2.

Should you require further information regarding this matter, please contact Mr. James M. Peschel, Manager-Regulatory Programs at (603) 773-7194.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

Ted C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer

cc: H. J. Miller, NRC Region I Administrator
G. Wunder, NRC Project Manager, Project Directorate I-2
NRC Senior Resident Inspector

IE22

Rec'd 01/14/02

ENCLOSURE 1 TO NYN-01102

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Reactor Trip Due to a Dropped Rod

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	15	01	01	- 003 -	00	12	14	01	N/A	
									FACILITY NAME	DOCKET NUMBER

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
POWER LEVEL (10)	100	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
James M. Peschel	(603) 773-7194

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A					N/A				

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO		N/A	N/A	N/A

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 15, 2001 at 1:07 PM, with the plant at 100% power, North Atlantic Energy Service Corporation (North Atlantic) experienced an automatic reactor trip. The reactor trip occurred when rod N11 dropped into the reactor core and a power range high flux rate trip (negative) signal was initiated. At the time of the rod drop event, rod N11 was being moved out from step 229 to step 231 during the performance of a quarterly rod operability check. The plant systems functioned properly during the initial reactor trip and subsequent transition to Mode 3, with two minor system issues that were not the result of the event. Operator response to the automatic trip was appropriate with no human performance issues identified.

The rod drop occurred while moving rod N11 out at step 230 when the stationary gripper did not fully engage prior to the movable gripper releasing. The root cause of the N11 Dropped Rod Event is particulate deposits in the rod drive housing and/or on the drive rod. These deposits inhibited the stationary gripper engagement on the drive rod.

A four hour and eight hour notification to the Nuclear Regulatory Commission (NRC) was made pursuant to the requirements of 10CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A). The event notification was 38390.

A change to Control Rod Drop Testing procedure will be made to obtain acceptable coil current traces for all control rods during the performance of rod drop testing that is preformed at the end of the refueling outage.

This License Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(iv)(A) .

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I. Description of Event

On October 15, 2001 at 1:07 PM, with the plant at 100% power, North Atlantic Energy Service Corporation (North Atlantic) experienced an automatic reactor trip. The reactor trip occurred when rod N11 dropped into the reactor core and a power range high flux rate trip (negative) signal was initiated. At the time of the rod drop event, rod N11 was being moved out from step 229 to step 231 during the performance of a quarterly rod operability check

The plant systems functioned properly during the initial reactor trip and subsequent transition to Mode 3, with two minor system problems. The two system problems are not event related and are currently being addressed by the corrective action program. Operator response to the automatic trip was appropriate with no human performance issues identified. The rod drop occurred while moving rod N11 out at step 230 when the stationary gripper did not fully engage prior to the movable gripper releasing.

A four hour and eight hour notification to the Nuclear Regulatory Commission (NRC) was made pursuant to the requirements 10CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A). The event notification is 38390. This License Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(iv)(A).

II. Cause of Event

The root cause of the N11 Dropped Rod Event is particulate deposits in the rod drive housing and/or on the drive rod. These deposits inhibited the stationary gripper engagement on the drive rod. The degraded control rod drive mechanism (CRDM) [AA] performance is evidenced by past occurrences of rod slipping.

There are two possible conditions where particle accumulation could affect control rod movement. The first being the creation of additional friction that the lift coil must overcome and the second being the particulate deposits interfering with the stationary gripper engagement.

The creation of additional friction is caused by particle accumulation restricting full rod movement when the control rods are moving outward. This results in the stationary gripper engaging on the drive rod flat "land" area instead of the rod grooves. The second method occurs when the stationary gripper attempts to engage, but due to deposits that may exist in the drive rod grooves, does not achieve full engagement. The exact mechanism or flow path that allows particulate matter to collect on the drive shaft or CRDM housing is unknown. The CRDM vendor has been unable to provide detailed causal information although they are cognizant of particulate matter as a cause of rod slips in the industry.

III. Analysis of Event

There were no radiological consequences as result of this event. This event is significant in that it resulted in a reactor trip which challenged the plant safety systems. The event itself had minor safety significance. The N11 dropped rod event is within the design basis of the plant. The Updated Final Safety Analysis Report (UFSAR) analysis for a dropped rod event is classified as an ANS condition II (i.e. moderate frequency) event that, at worst, results in a reactor trip with the plant being capable of returning to operation. Therefore, the combination of a rod drop event followed by a reactor trip is consistent with the design of the plant for an ANS condition II event.

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III. Analysis of Event (Continued)

The control rod drive mechanisms primary function is to insert or withdraw the Rod Cluster Control Assemblies (RCCA) within the core to control average core temperature and to shut down the reactor.

As stated above, the cause of the event is particulate deposits in the rod drive housing and/or the drive rod that inhibited the stationary gripper from engaging on the drive rod. The existence of particulate in the Reactor Coolant System (RCS) [AB] at the CRDM's location has been confirmed through chemistry monitoring during rod operability surveillance testing as well as direct observation of particulate coming off the drive rods during refueling when the de-latching tool is attached to the drive rods. Chemical sampling and analysis has identified these deposits as Iron (Fe), Nickel (Ni), and Cobalt 58 (Co58). It is postulated that the deposits are either creating additional friction that the lift coil must overcome or interfering with the stationary gripper engagement. The amount of particulate suspended within the RCS as a percent of system volume is believed to be small due to the filtration of letdown flow at the sub-micron level of 0.1 micron. However, the CRDM mechanisms are in a unique location within the RCS above the reactor vessel head in a relatively low flow area. This low flow zone is postulated to be responsible for allowing entrained particles to come out of suspension, accumulate, and be deposited on both the drive rod grooves and/or around the mechanism mechanical parts, i.e. armatures, link arms, and latches. The actual particle deposition mechanism could not be conclusively determined.

IV. Corrective Action

1. In an effort to dislodge any loose particulate and improve rod performance, all control rod banks were exercised per the vendor recommendations.
2. Electrical traces were taken and reviewed for the control and shutdown bank rods for repeatability of satisfactory electronic data and stroking exercise results.
3. Rod drop testing was performed satisfactorily on all the rods.
4. Rod N11 was equipped with instrumentation and monitored with satisfactory results during reactor startup.
5. The "Quarterly Rod Operability Surveillance" was revised to include instructions to obtain current traces for stationary, movable, and lift coils for all rods during scheduled movement and evaluate the traces.
6. The "Control Rod Drop Testing" procedure will be revised to obtain and evaluate current traces for stationary, movable, and lift coils for all control rods during the performance of rod drop testing, post refueling outage. Should any rod display an unacceptable trace, the rod in question will be exercised in and out until an acceptable trace has been obtained.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

V. Additional Information

None

Similar Events

In the past, there have been several occasions where North Atlantic has experienced rod slippage. Two of these occasions have resulted in License Event Reports (LER). The first, LER 91-13, describes a condition where Shutdown Bank C rod N5 dropped from a group step demand position of 37 steps to 18 steps. The plant was in Mode 3 and the 18-month rod position indication system surveillance was being performed. There were two probable causes identified for that event. The first was boron precipitation that may have occurred during the refueling outage and the second probable cause was the deposition of wear particulate on the CRDM for rod N5.

The second LER 00-003 reported a condition where during the quarterly rod operability surveillance, two of the four Shutdown Bank E rods were identified as mis-aligned. This is a condition that is prohibited by the Technical Specifications. The original LER submittal was not able to identify the root cause for the event. Subsequent troubleshooting initially identified a slave cycler decoder card that was not properly seated as the cause. During the analysis of the event described in LER 00-003, current traces were taken of the rod in question. It is now believed that after reviewing the current traces from the LER 00-003 event as part of the root cause evaluation for the current dropped rod N11 event, the root cause of both events are particulate deposits in the rod drive housing and/or on the drive rod.

This has been determined to be the most likely cause of the event described in LER 00-003.

ENCLOSURE 2 TO NYN-01102

NRC COMMITMENTS CONTAINED IN NYN-01102

	Description of Commitment
CR 01-10868	The "Control Rod Drop Testing" procedure will be revised to obtain and evaluate current traces for stationary, movable, and lift coils for all control rods during the performance of rod drop testing, post refueling outage. Should any rod display an unacceptable trace, the rod in question will be exercised in and out until an acceptable trace has been obtained.